BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

ALLAN RATNER
RATNER & PRESTIA
P. O. BOX 980
VALLEY FORGE, PA 19482

UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

NOTIFICATION OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

Date of Mailing: 16 AUG 1993

File Reference: MUR-3490

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International application Number	International filing date	Priority date claimed
PCT/GB91/01599	18 SEPTEMBER 1991	29 SEPTEMBER 1990

Applicant for DO/EO/US
SMITH, DAVID BALFOUR

NOTIFICATION

The applicant is hereby advised that the Unites States Patent and Trademark Office in its capacity as a ☐ Designated Office, ☑ Elected Office, has determined that the above identified international application has met the requirements of 35 U.S.C. 371 and 37 CFR ☐ 1.494, ☑ 1.495 and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Serial Number assigned to the application and the relevant dates are:

08/030,309	07 MAY 1993	07 MAY 1993
U.S.NATIONAL SERIAL NO.	35 U.S.C. 102(e) DATE	DATE OF RECEIPT 35 U.S.C. 371 REQUIREMENTS

☑ A request for immediate examination under 35 U.S.C. 371 (f) was received on 29 MAR 1993 and the application will be examined in turn.

☐ No request for immediate examination under 35 U.S.C. 371(f) was received. The application will not be processed or examined before the time limit set forth in either ☐ PCT Article 23 (Chapter I of the PCT), or ☐ PCT Article 40 (Chapter II of the PCT) whichever is applicable.

UNITED STATES DESIGNATED/ELECTED OFFICE

ADDRESS ONLY:
COMMISSIONER OF PATENTS AND TRADEMARKS
Box PCT, Attn. DO/EO/US
Washington, D.C. 20231

AUTHORIZED OFFICER
Anita Johnson

PATENT COOPERATION TREATY

TO

Murgitroyd and Company
Chartered Patent Agents
Mitchell House
333 Bath Street
GLASGOW
G2 4ER

Inscribe NAME and ADDRESS of the AGENT and if there is no agent, of the APPLICANT

FROM the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY identified at the bottom of this page

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Issued pursuant to PCT Rule 71.1

DATE OF MAILING by the International Preliminary Examining Authority	22 JUN 1992
APPLICANT'S OR AGENT'S FILE REFERENCE	P36197/SH/SP/SC

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.	International Filing Date
PCT/GB 91/01599	18 September 1991 (18.09.91)

Applicant (Name)

METROL TECHNOLOGY LIMITED ET AL

NOTIFICATION

The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the above-identified international application.

The attention of the applicant is drawn to the reminder contained in Form PCT/IB/332, which he received from the International Bureau, concerning the time limits within which he must perform certain acts before each elected Office.

A copy of the report and its annexes, if any, has this same day also been transmitted to the International Bureau

THE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

Name and Ma	Authorized Officer
THE PATENT OFFICE CARDIFF RD. NEWPORT GWENT NP9 1RH	J BETTS GR78 Concept 0633 814608

Form PCT/IPEA/416 (January 1985)

PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

Applicant's or Agent's File Reference: P3698/SM/NP/SC

International Application No.: PCT/GB91/01599

International Filing Date: 18 September 1991 (18.09.91)

Receiving Office: UK PATENT OFFICE

Priority Date Claimed: 29 September 1990 (29.09.90)

Applicant (Name): METROL TECHNOLOGY LIMITED ET AL

BASIS OF REPORT

1. AMENDMENTS AND/OR RECTIFICATIONS[1] — The amendments and/or rectifications made before this International Preliminary Examining Authority in respect of the claims, the description, and/or drawings in the above-identified international application are annexed to this report.

a. [X] This report has been established on the basis of the following application documents:

[ ] the application documents as filed		
[X] description, pages	1–7	as originally filed
description, pages		filed with your letter of
description, pages		filed with your letter of
description, pages		filed with your letter of
[X] claim(s)		as originally filed
claim(s)	1–13	filed with your letter of 11 June 1992 (11/06/92)
claim(s)		filed with your letter of
claim(s)		filed with your letter of
[X] drawings, sheet/fig.	1–3	as originally filed
drawings, sheet/fig.		filed with your letter of

b. [X] The amendments resulted in the cancellation of the following sheets: Pages 8–11

c. [ ] This report has been established as if the amendments indicated on the extra sheet have not been made, since, for the reasons indicated, they have been considered to go beyond the disclosure as filed.

2. PRIORITY[2]

a. This report has been established as if no priority has been claimed due to the failure to furnish within the prescribed time limit the requested:

[ ] copy of the earlier application whose priority has been claimed.

[ ] translation of the earlier application whose priority has been claimed.

b. [ ] This report has been established as if no priority has been claimed due to the fact that the priority claim has been found invalid.

Thus, for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

[2] Where replacement sheets are annexed to this report, a translation of these replacement sheets must be furnished to the elected Offices within the time limit applicable under PCT Article 39(1).

CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all.) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.5 E21B47/12 G08C23/00

REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS) AND INDUSTRIAL APPLICABILITY (IA) [6] AND CITATIONS [7] AND EXPLANATIONS [8] SUPPORTING SUCH STATEMENT

CLAIM NUMBER	STATEMENT (CRITERIA)	CITATIONS AND EXPLANATIONS
1-13	Yes (N, IS, IA)	All claims meet the requirements of industrial applicability, novelty and inventive step. Both Claims 1 and 6 require the provision of a store to receive data transmitted along an elongate member within the borehole. None of the cited documents shows this combination. Only GB 1096388 A shows a data store, but there seems no justification for combining this with the other cited documents which are all concerned with transmission direct to the surface along the drill string.

See notes on accompanying s

NON-WRITTEN DISCLOSURES [9]

Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure

CERTAIN PUBLISHED DOCUMENTS [10]

Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION [11]

The following defects in the form or contents of the international application have been noted.

CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION [12]

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description have been noted.

CERTIFICATION

Date Demand Submitted	Date of Completion of the International Preliminary Examination Report
30 March 1992 (30.03.92)	22 June 1992 (22/06/92)
International Preliminary Examining Authority	**Signature of Authorized Officer**
UK PATENT UNITED KINGDOM	

See notes on accompanying she

CLAIMS

1. A method of transmitting data in a borehole, the method comprising providing an electric signal representative of the data to be transmitted, converting said electric signal into a sonic signal and propagating said sonic signal along an elongate member, said data being transmitted from one side to the other of a physical obstruction in said elongate member, the conversion of the electric signal into the sonic signal being effected at a location on said one side; characterised in that said sonic signal is converted into an electrical signal on said other side of said obstruction and said data is stored on said other side for subsequent retrieval.

2. A method according to claim 1, in which the subsequent retrieval is effected by a pick-up tool lowered down the borehole to a location adjacent the obstruction.

3. A method according to claim 1, in which conversion from the electric signal to the sonic signal includes digital modulation of a carrier frequency in the range 100 Hz to 10 kHz.

4. A method according to claim 1, in which the sonic transmission is effected by longitudinal vibration.

5. A method according to claim 1, in which the elongate member is a drill stem, the obstruction is a shut-in valve in the drill stem, and the data

comprises pressure-versus-time in the drill stem beneath the shut-in valve.

6. Apparatus for transmitting data in a borehole, the apparatus comprising a transmitter and a receiver; the transmitter including means for converting data parameters into an electric signal and first transducer means responsive to said electric signal to generate an acoustic signal, the first transducer means being adapted for physical coupling to an elongate member extending along the borehole whereby the acoustic signal is propagated in said elongate member; the receiver comprising second transducer means adapted for physical coupling to said elongate member to produce an electrical output corresponding to said acoustic signal, and signal processing means connected to receive said output and operative to process the data into a condition for onward transmission; characterised in that said signal processing means includes memory means for storing received data, and means for transferring data from the memory means to a pick-up tool lowered to an adjacent location in the borehole.

7. Apparatus according to claim 6 for use in transmitting data from one side to the other of an obstruction in said elongate member, the first transducer means being coupled, in use, to the elongate member at a location on said one side of the obstruction, and the second transducer means being coupled, in use, to the elongate member at the other side of the obstruction.

SUBSTITUTE SHEET

8. Apparatus according to claim 6, in which the first transducer means is a magnetostrictive transducer adapted to be mounted to the elongate member to produce longitudinal sonic vibrations in it.

9. Apparatus according to claim 7, in which the data parameter converting means is a fluid pressure transducer for monitoring fluid pressure below said obstruction.

10. Apparatus according to claim 6, in which said second transducer means comprises a mechanical bandpass filter and a piezoactive element mounted in series on the elongate member.

11. Apparatus according to claim 6, in which the signal processing means includes electronic filter means.

12. Apparatus according to claim 6, in which the pick-up tool includes further memory means in which the data may be stored until the pick-up tool is returned to the surface.

13. Apparatus according to claim 6, in which the pick-up tool includes means for transmitting the data to the surface via a cable.

PATENT COOPERATION TREATY

02 MAR 1992

INTERNATIONAL SEARCH REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION	Applicant's or Agent's File Reference P8698/SFM/NP
International Application N . PCT/ GB91/01599	International Filing Date 18/09/91
Receiving Office RO/ GB	Priority Date Claimed 29/09/90
Applicant (Name) Metrol Technology Ltd. et al.	

I. ☐ CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1] (Observations on supplemental sheet (2))

II. ☐ UNITY OF INVENTION IS LACKING [2] (Observations on supplemental sheet (2))

III. TITLE, ABSTRACT AND FIGURE OF DRAWING

1. The following indicated items are approved as submitted by the applicant: [3]
   ☒ Title. ☒ Abstract.
2. The texts established by this International Searching Authority of the following indicated items are set forth below:
   ☐ Title.
   ☐ Abstract.

☐ Text of the abstract continued on supplemental sheet (1)

3. a. ☐ The definitive contents of the abstract are established by this International Searching Authority as proposed in form PCT/ISA/204, previously sent to the applicant.
   b. ☐ This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Auth rity has not expired. [4]

4. Figure to be published with the abstract [5]
   Figure No. 1 ☐ None of the Figures
   ☒ as suggested by the applicant
   ☐ because the applicant failed to suggest a figure
   ☐ because this figure better characterizes the invention

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 91/01599

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 E21B47/12; G08C23/00

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	E21B ; G08C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X Y	EP,A,0 033 192 (SPERRY CORPORATION) 5 August 1981 see page 1, line 1 - page 2, line 17; claims ---	1,2,6-14 3-4, 15-17
Y	GB,A,1 096 388 (TEXACO DEVELOPMENT CORPORATION) 29 December 1967 see the whole document ---	3,4, 15-17
X	US,A,4 293 936 (COX) 6 October 1981 see claims ---	1,2,5,6, 9,10,18
X	WO,A,8 910 573 (ATLANTIC RICHFIELD COMPANY) 2 November 1989 see page 2, line 16 - page 3, line 22; claims 1-4,12,13 ---	1,9

° Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
08 JANUARY 1992	17. 01. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	REEKMANS M.V.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9101599 SA 51504

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 08/01/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0033192	05-08-81	US-A- 4283780	11-08-81
		US-A- 4302826	24-11-81
		US-A- 4282588	04-08-81
		JP-A- 56125595	01-10-81
GB-A-1096388		None	
US-A-4293936	06-10-81	CA-A- 1098202	24-03-81
		DE-A,C 2758770	20-07-78
		FR-A,B 2376288	28-07-78
		GB-A- 1598340	16-09-81
		JP-C- 1394519	11-08-87
		JP-A- 53101453	04-09-78
		JP-B- 62002113	17-01-87
WO-A-8910573	02-11-89	US-A- 4992997	12-02-91
		AU-A- 3689489	24-11-89

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : E21B 47/12, G08C 23/00 — A1

(11) International Publication Number: WO 92/062

(43) International Publication Date: 16 April 1992 (16.04.

(21) International Application Number: PCT/GB91/01599

(22) International Filing Date: 18 September 1991 (18.09.91)

(30) Priority data:
9021253.1 29 September 1990 (29.09.90) GB

(71) Applicant (for all designated States except US): METROL TECHNOLOGY LIMITED [GB/GB]; 1 Whitemyres Avenue, Maxtrick, Aberdeen AB2 6HQ (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only) : SMITH, David, Balfour [GB/GB]; East Nesk, Netherley, Stonehaven, Kincardineshire AB3 2NQ (GB).

(74) Agent: PATTULLO, Norman; Murgitroyd and Company, Mitchell House, 333 Bath Street, Glasgow G2 4ER (GB).

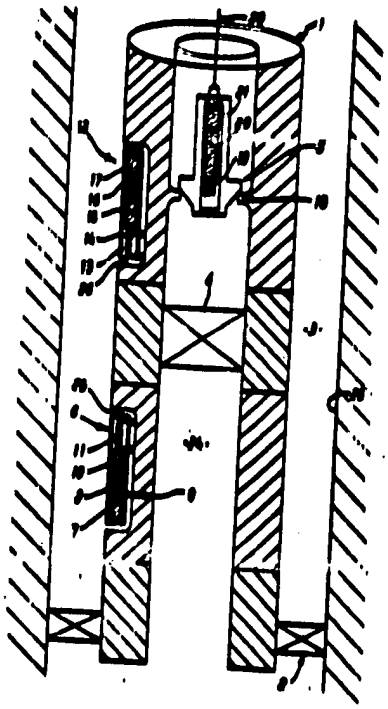
(81) Designated States: AT (European patent), AU, BB, (European patent), BF (OAPI patent), BG, BJ (OA patent), BR, CA, CF (OAPI patent), CG (OAPI paten CH (European patent), CI (OAPI patent), CM (OA patent), CS, DE (European patent), DK (European p tent), ES (European patent), FI, FR (European paten GA (OAPI patent), GB, GB (European patent), G (OAPI patent), GR (European patent), HU, IT (Eur pean patent), JP, KP, KR, LK, LU (European patent MC, MG, ML (OAPI patent), MR (OAPI patent), MW NL (European patent), NO, PL, RO, SD, SE (Europea patent), SN (OAPI patent), SU*, TD (OAPI patent), T (OAPI patent), US.

Published
With international search report.

(54) Title: TRANSMISSION OF DATA IN BOREHOLES

(57) Abstract

Data is transmitted along a borehole containing a drill ste (2) by means of a transmitter (6) which converts electric data signal to acoustic signals propagating along the drill stem (2). The acoustic signals are converted back to electric form by a receiver (12) which also processes the signals. In the preferred form the signals are stored in a receiver memory (15) for subsequent retrieval using a pick-up tool (5) lowered into the borehole. The system is particularly useful in moving data past an obstruction such as a shut-in valve (4).



See back of page

International Application No PC[redacted] 91/01599

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 E21B47/12; G08C23/00

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	E21B ; G08C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	EP,A,0 033 192 (SPERRY CORPORATION) 5 August 1981	1,2,6-14
Y	see page 1, line 1 - page 2, line 17; claims	3-4, 15-17
Y	GB,A,1 096 388 (TEXACO DEVELOPMENT CORPORATION) 29 December 1967 see the whole document	3,4, 15-17
X	US,A,4 293 936 (COX) 6 October 1981 see claims	1,2,5,6, 9,10,18
X	WO,A,8 910 573 (ATLANTIC RICHFIELD COMPANY) 2 November 1989 see page 2, line 16 - page 3, line 22; claims 1-4,12,13	1,9

* Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
08 JANUARY 1992	17. 01. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	REEKMANS M.V.

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. GB 9101599
SA 51504

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 08/01/92

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0033192	05-08-81	US-A-	4283780	11-08-81
		US-A-	4302826	24-11-81
		US-A-	4282588	04-08-81
		JP-A-	56125595	01-10-81
GB-A-1096388		None		
US-A-4293936	06-10-81	CA-A-	1098202	24-03-81
		DE-A,C	2758770	20-07-78
		FR-A,B	2376288	28-07-78
		GB-A-	1598340	16-09-81
		JP-C-	1394519	11-08-87
		JP-A-	53101453	04-09-78
		JP-B-	62002113	17-01-87
WO-A-8910573	02-11-89	US-A-	4992997	12-02-91
		AU-A-	3689489	24-11-89

EPO FORM P0479

Copy for the designated Office (DO/ US

PATENT COOPERATION T(ATY

FROM
the INTERNATIONAL BUREAU of the
WORLD INTELLECTUAL PROPERTY
ORGANIZATION

NOTIFICATION OF THE RECORDING OF A
CHANGE
UNDER PCT RULE 92BIS

Issued Pursuant to PCT Administrative
Instructions, Section 422

TO
PATTULLO, Norman
Murgitroyd and Company
Chartered Patent Agents
Mitchell House
333 Bath Street
Glasgow G2 4ER
ROYAUME-UNI

DATE OF MAILING by the International Bureau
10 April 1992 (10.04.92)

APPLICANT's OR AGENT's FILE REFERENCE
P8698/SFM/NP

IDENTIFICATION OF THE INTERNATINAL APPLICATION

International Application No.
PCT/GB91/01599

International Filing Date
18 September 1991 (18.09.91)

NOTIFICATION

The following information previously appeared on record concerning the:

☒ applicant ☐ inventor ☐ agent or common representative

Name
METROL TECHNOLOGY LIMITED

Address
No 1, Whitemyres Avenue
Mastrick
Aberdeen AB2 6HQ
Great Britain

Nationality (country code): GB
Residence (country code):
Telephone number:
Telegraphic address:
Teleprinter address:

The International Bureau hereby notifies that the following change was recorded:

Change of address.

Name

Address
Unit 24
Kirkhill Place
Kirkhill Industrial Estate
Dyce
Aberdeen AB2 OGU
Great Britain

Nationality (country code):
Residence (country code):
Telephone number:
Telegraphic address:
Teleprinter address:

The International Bureau has sent a copy of this notification to the:

☒ receiving Office
☐ International Searching Authority
☒ International Preliminary Examining Authority
☐ designated Offices concerned
☑ elected Offices concerned

THE INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION

Mailing Address
WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Authorized Officer
M.C. Taylor

Form PCT/IB/306 (January 1985)

PATENT COOPERATION TREATY

INTERNATIONAL APPLICATION NO. PCT/GB91/01599

NOTIFICATION TO THE DESIGNATED OFFICE OF RECEIPT OF RECORD COPY issued under PCT Rule 24.2(a)

To:

United States Patent and Trademark Office
Washington, D.C.

in its capacity as a designated Office

APPLICANT'S OR AGENT'S FILE REFERENCE:
P8698/SFM/NP

DATE OF MAILING OF THIS NOTIFICATION:
10 October 1991 (10.10.91)

From:
The International Bureau of WIPO
1211 Geneva 20
Switzerland

NAME(S) OF APPLICANT(S):

SMITH, David, Balfour

INTERNATIONAL FILING DATE:
18 September 1991 (18.09.91)

PRIORITY DATE(S) CLAIMED:
29 September 1990 (29.09.90)

DATE OF RECEIPT OF RECORD COPY BY INTERNATIONAL BUREAU:
10 October 1991 (10.10.91)

M.C. Taylor
(Authorized Officer)

Form PCT/IB/302 (January 1984)

PCT/GB91/01599

PATENT COOPERATION TREATY

TO:

United States Patent
and Trademark Office
Washington, D.C.

FROM:

the INTERNATIONAL BUREAU of the
WORLD INTELLECTUAL PROPERTY
ORGANIZATION

NOTIFICATION CONCERNING
DOCUMENTS TRANSMITTED

Issued pursuant to PCT
Article 36(3)(a)

(as elected Office)

Date of Mailing:

29 June 1992 (29.06.92)

NOTIFICATION

The International Bureau transmits herewith the following documents and number thereof:

1 (number of) copy(s) of the international preliminary examination report and annexes (Article 36(3)(a)).

This notification is sent to the above addressee in its capacity as an elected Office.

THE INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION

Mailing Address:

WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Authorised Officer:

M. Abidine

PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

Applicant's or Agent's File Reference: P3698/SM/NP/SC

International Application No.	International Filing Date
PCT/GB91/01599	18 September 1991 (18.09.91)
Receiving Office	**Priority Date Claimed**
UK PATENT OFFICE	29 September 1990 (29.09.90)

Applicant (Name)

METROL TECHNOLOGY LIMITED ET AL

BASIS OF REPORT

1. AMENDMENTS AND/OR RECTIFICATIONS[1*] — The amendments and/or rectifications made before this International Preliminary Examining Authority in respect of the claims, the description, and/or drawings in the above-identified international application are annexed to this report.

a. [X] This report has been established on the basis of the following application documents:

- [ ] the application documents as filed
- [X] description, pages 1–7 as originally filed
- description, pages ... filed with your letter of ...
- description, pages ... filed with your letter of ...
- description, pages ... filed with your letter of ...
- [X] claim(s) ... as originally filed
- claim(s) 1–13 filed with your letter of 11 June 1992 (11/06/92)
- claim(s) ... filed with your letter of ...
- claim(s) ... filed with your letter of ...
- [X] drawings, sheet/fig. 1–3 as originally filed
- drawings, sheet/fig. ... filed with your letter of ...

b. [X] The amendments resulted in the cancellation of the following sheets: Pages 8–11

c. [ ] This report has been established as if the amendments indicated on the extra sheet have not been made, since, for the reasons indicated, they have been considered to go beyond the disclosure as filed.

2. PRIORITY[2]

a. This report has been established as if no priority has been claimed due to the failure to furnish within the prescribed time limit the requested:

- [ ] copy of the earlier application whose priority has been claimed.
- [ ] translation of the earlier application whose priority has been claimed.

b. [ ] This report has been established as if no priority has been claimed due to the fact that the priority claim has been found invalid.

Thus, for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

* Where replacement sheets are annexed to this report, a translation of these replacement sheets must be furnished to the elected Offices within the time limit applicable under PCT Article 39(1).

CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all.) [5]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.5 E21B47/12 G08C23/00

REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS) AND INDUSTRIAL APPLICABILITY (IA) [6] AND CITATIONS [7] AND EXPLANATIONS [8] SUPPORTING SUCH STATEMENT

CLAIM NUMBER	STATEMENT (CRITERIA)	CITATIONS AND EXPLANATIONS
1-13	Yes (N, IS, IA)	All claims meet the requirements of industrial applicability, novelty and inventive step. Both Claims 1 and 6 require the provision of a store to receive data transmitted along an elongate member within the borehole. None of the cited documents shows this combination. Only GB 1096388 A shows a data store, but there seems no justification for combining this with the other cited documents which are all concerned with transmission dir ct to the surface along the drill string.

See notes on accompanying sheet

N N-WRITTEN DISCLOSURES [9]

Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure

CERTAIN PUBLISHED DOCUMENTS [10]

Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION [11]

The following defects in the form or contents of the international application have been noted.

CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION [12]

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description have been noted.

CERTIFICATI N

Date Demand Submitted	Date of Completion of the International Preliminary Examination Report
30 March 1992 (30.03.92)	22 June 1992 (22/06/92)
International Preliminary Examining Authority	**Signature of Authorized Officer**
UK PATENT UNITED KINGDOM	

CLAIMS

1. A method of transmitting data in a boreh l , the method comprising providing an electric signal representative of the data to be transmitted, converting said electric signal into a sonic signal, propagating said sonic signal along an elongate member, and processing the sonic signal for onward transmissior.

2. A method according to claim 1, in which data is transmitted from one side to the other of a physical obstruction in said elongate member, the conversion of the electric signal into the sonic signal being effected at a location on said one side, and the processing being effected at said other side.

3. A method according to claim 1 or claim 2, in which said processing comprises storing the data for subsequent retrieval.

4. A method according to claim 3, in which the subsequent retrieval is effected by a pick-up tool lowered down the borehole to a location adjacent the obstruction.

5. A method according to claim 1 or claim 2, in which said processing comprises sonic re-transmission.

6. A method according to any one of the preceding claims, in which conversion from the electric signal to the sonic signal includes digital modulation or a carrier frequency in the range 100 Hz to 10 kHz.

Replaced by Article 34

7. A method according to any one of the preceding claims, in which the sonic transmission is effected by longitudinal vibration.

8. A method according to claim 2, in which the elongate member is a drill stem, the obstruction is a shut-in valve in the drill stem, and the data comprises pressure-versus-time in the drill stem beneath the shut-in valve.

9. Apparatus for transmitting data in a borehole, the apparatus comprising a transmitter and a receiver; the transmitter including means for converting data parameters into an electric signal and first transducer means responsive to said electric signal to generate an acoustic signal, the first transducer means being adapted for physical coupling to an elongate member extending along the borehole whereby the acoustic signal is propagated in said elongate member; the receiver comprising second transducer means adapted for physical coupling to said elongate member to produce an electrical output corresponding to said acoustic signal, and signal processing means connected to receive said output and operative to process the data into a condition for onward transmission.

10. Apparatus according to claim 9 for use in transmitting data from one side to the other of an obstruction in said elongate member, the first transducer means being coupled, in use, to the elongate member at a location on said one side of the obstruction, and the second transducer means being coupled, in use, to the elongate member at the other side of the obstruction.

Replaced by Article 34

11. Apparatus according to claim 9 or claim 10, in which the first transducer means is a magnetostrictive transducer adapted to be mounted to the elongate member to produce longitudinal sonic vibrations in it.

12. Apparatus according to claim 10, in which the data parameter converting means is a fluid pressure transducer for monitoring fluid pressure below said obstruction.

13. Apparatus according to any of claims 9 to 12, in which said second transducer means comprises a mechanical bandpass filter and a piezoactive element mounted in series on the elongate member.

14. Apparatus according to any of claims 9 to 13, in which the signal processing means includes electronic filter means.

15. Apparatus according to any of claims 9 to 14, in which the signal processing means includes a memory for storing received data, and means for transferring data from the memory to a pick-up tool lowered to an adjacent location in the borehole.

16. Apparatus according to claim 15, in which the pick-up tool includes a further memory in which the data may be stored until the pick-up tool is returned to the surface.

17. Apparatus according to claim 15, in which the pick-up tool includes means for transmitting the data to the surface via a cable.

Replaced by Article 34

18. Apparatus according to any of claims 9 to 14, in which the signal processing means includes a further electroacoustic transducer for retransmitting the data as an acoustic signal along the elongate member.

Replaced by Article 34